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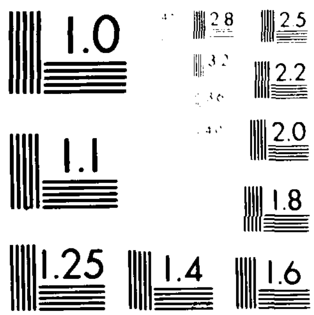

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THE USEFULNESS OF PRECIOUS METAL RECOVERY MANAGEMENT SYSTEM INFORMATION AS THE BASIS FOR ASSIGNMENT OF A PRECIOUS METALS INDICATOR CODE

John A. Berg, GS-11
Wayne R. Woosley, GS-11

LSSR 41-80

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The Defense Logistics Agency (DLA) is responsible for the administration of the Defense Precious Metals Program. DLA has established a series of Precious Metals Indicator Codes (PMIC) to indicate the type and relative amount of precious metals in DoD items. DoD item managers are to assign PMICs to all items under their control. Once PMICs are recorded in item managers' supply management data, they will be entered on Disposal Turn-In Documents when items are offered to Defense Property Disposal Offices (DPDO) for disposal. DPDOs will use PMICs to identify those items whose precious metals content is to be recovered for future DoD use. Item managers have not begun the PMIC assignment process. The authors hypothesize that PMIC assignment by item managers using transaction information from the DLA Precious Metals Recovery Management System (PMRMS) will result in significant cost savings for DoD. Significant per item cost savings are shown to occur using the PMRMS method for assigning PMICs; however, the significance of total cost savings accruing to DoD was not conclusively determined. The potential of using Federal Item Identification Guide (FIIG) information for assigning PMICs was also discussed.

LSSR 41-80

THE USEFULNESS OF PRECIOUS METAL RECOVERY MANAGEMENT SYSTEM INFORMATION AS THE BASIS FOR ASSIGNMENT OF A PRECIOUS METALS INDICATOR CODE

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

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In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

By

John A. Berg, BA
GS-11

Wayne R. Woosley, BA
GS-11

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This thesis, written by

John A. Berg, GS-11

and

Wayne R. Woosley, GS-11

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

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Chapter 1

INTRODUCTION

Background

> The Federal Property and Administrative Services Act of 1949, as amended (Act of 30 June 1949, 63 Stat. 377, 40 U.S.C. 471), assigned the responsibility for the supervision and direction over the disposition of excess and surplus property to the Administrator of General Services. The Act further assigned the responsibility for supervision and direction over the disposition of DoD foreign excess property to the Secretary of Defense [22:p. II-1].

For that excess and surplus property generated by DoD, the Administrator of General Services delegated the responsibility for its disposition to the Secretary of Defense (22:p. II-1). The Secretary of Defense assigned the Defense Logistics Agency (DLA)[1] overall command, management, and administration of the Defense Personal Property Disposal Program[2] as well as the responsibility for the administration of the Defense Precious Metals Program (22:p. II-1).

When a Military Service/Defense Agency determines a

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[1] All acronyms appearing in this thesis will be defined prior to their use. A summary list of acronyms used in this thesis is provided as Appendix A.

[2] Does not include the disposal of contractor inventory which falls under the purview of the Defense Acquisition Regulation (DAR).

quantity of personal property[3] is excess to its needs, it arranges for the turn-in of such property to the nearest Defense Property Disposal Office (DPDO). There are DPDOs or DPDO off-site branches located on most Military Service/Defense Agency installations, worldwide. The DPDO is the field level activity of DLA having accountability for and control over disposable property (22:p.III-5). Once the DPDO has inspected the proffered property and verified it against the requisite turn-in documentation, accountability for the property is transferred from the generating activity to the DPDO. After this accountability transfer is recorded in the property accounting system maintained by the Defense Property Disposal Service (DPDS), the DLA Primary Level Field Activity exercising program management and staff supervision of the Defense Personal Property Program (22:p.II-3), the disposable property is subject to one or more of four distinct disposition methods. Both excess and foreign excess property are "screened" for possible reutilization by another Military Service/ Defense Agency (first priority) or transfer to other Federal Agencies. Excess property not reutilized or transferred is then made available

[3]Terms which have specific meanings when used in a DoD property disposal context are defined in the Glossary of Terms provided as Appendix B.

for donation to "authorized donees."[4] Excess property not reutilized, transferred, or donated is then considered surplus property and eligible for sale. Likewise, foreign excess property not reutilized or transferred is also eligible for sale. Surplus property and eligible foreign excess property not sold is either abandoned or destroyed (22:p.XIV-1).

Normally, sale of surplus and foreign excess property as a single item or as an item in a lot is the preferred method of sale since this method normally brings the highest rate of sales proceeds return to the acquisition cost of the disposable item. However, due to the inherent nature of the disposal process, much disposable property is of such condition that it "appears to have no value except for its basic material content." This is the DoD definition of scrap (22:p.III-12). Scrap is accounted for by its appropriate Scrap Classification Lists code (SCL), weight, and applicable demilitarization code. Maximum segregation, within manpower constraints, of scrap

[4]Donation of disposable property is limited to surplus property only. Controlled substances, exchange/sale property, foreign equity property, and nonappropriated fund property cannot be donated. In addition, other certain surplus items may require special processing in accordance with DoD 4160.21-M-1, the Defense Demilitarization Manual, or Chapter VI of DoD 4160.21-M, the Defense Disposal Manual. Classes of eligible donees include states in major disaster areas, public airports, service educational activities, veterans organizations, museums, incorporated municipalities, and other public agencies and bodies. All donation requests from these activities must have prior approval of the governing General Services Administration Regional Office (22:p.X-1).

material into like composition accumulations by both generating activities (prior to turn-in) and DPDOs is encouraged. As a general rule, the more "pure" a scrap accumulation is, the higher the price per unit of weight. This segregation policy is the foundation for the accumulation of certain metals that bring a considerably higher price then others. Such metals may be classified into two groups: so-called "exotic" metals and precious metals. Examples of exotic metals that bring considerably higher prices than common metals like iron are titanium, mercury, and lead. Precious metals have been defined as gold, silver, and the platinum family of metals (24:p. 1).

Individual Military Services have had an interest in the recovery of specific precious metals for some years. As far back as 1954, the U.S. Navy established a profitable silver recovery program by retrieving silver from torpedo batteries (25:33). In 1965, the U.S. Army began to reclaim gold from eyeglass frames, uniform buttons, insignia, and medals (25:33). Additional efforts included the recovery of platinum from aircraft spark plugs and electrical contact points (25:33). With the issuance of DoD Directive 4160.22, "Reclamation and Utilization of Silver from Scrap Materials," dated August 23, 1968 (superseded), DoD generators of spent fixing solution (hypo) including hospitals, dispensaries, dental clinics, photographic laboratories, printing plants, hobby craft shops, and microfilm and

microfiche producting facilities were encouraged to recover the significant amounts of high purity silver present in hypo solution. The early Navy silver recovery efforts evolved into a Navy-managed silver recovery activity at the Naval Ammunition Depot-Earle in Colts Neck, New Jersey. The Army-managed gold recovery efforts became centralized at the Pueblo Army Depot in Colorado. On October 1, 1974, the separate Navy silver recovery and the Army gold recovery programs were combined, with overall management of the combined program assigned to DLA (21:1). Operational control of the program and the two separate sites were further delegated by DLA to DPDS; headquartered in Battle Creek, Michigan. The silver recovery activity was renamed the Defense Property Disposal Precious Metals Recovery Office-Earle, and the gold recovery activity became an organizational element of DPDO Pueblo. Further organizational change occurred with the issuance of DoD Directive 4160.22, "Recovery and Utilization of Precious Metals," dated December 1, 1976. The Defense Property Disposal Precious Metals Recovery Office (DPDM-R), remaining at Colts Neck, was upgraded to DLA secondary level field activity status and assumed responsibility for day to day operations as they relate to the recovery aspects of the program (22:p.XVII-1). While DLA retained the responsibility for administering the overall Precious Metals Recovery Program (PMRP) (24:p.1), DPDS' program function became one of administrative

support to DPDM-R.

Current Recovery Efforts

The recovery of precious metals begins when a DPDO is made aware that certain disposable property may contain precious metals. It is important to note that certain knowledge that an item contains precious metals is not requisite for the recovery process to begin; only that a DPDO is cognizant of a possibility that an item may contain precious metals (22:p.XVII-3). Currently, the DPDO may be made aware of the possible existence of precious metals in three ways. First, the generator of the precious metals-bearing material may identify it as such on the Disposal Turn-In Document (DTID) (22: p.XVII-3). This will most likely occur with turn-ins of scrap with a large percent silver content such as spent fixing solution and amalgam. The receipt inspection process is the second source of precious metals awareness (22:p.XVII-3). In the course of verifying quantity and item identity and determining the condition of the turn-in, experienced and trained receiving personnel may spot unidentified precious metals-bearing items. Those receiving personnel who have attended the Defense Metals Identification Course[5] have the additional

[5]The Defense Metals Identification Course and the rest of the Defense Property Disposal courses are conducted by the U.S. Army Logistics Management Center at Fort Lee, Virginia.

capability to administer spark analysis and acid tests, two tests commonly used to identify an item's metal composition. This physical identification is generally only successful when receiving personnel are experienced and trained observers, and they are inspecting an item whose precious metals content appears on the outer surfaces of the item. The third way a DPDO can be made aware of an item's precious metals content is by *post facto* notification through the DPDS property accounting system, the Integrated Disposal Management System (IDMS) (9:1). The IDMS is a batch processing system run in weekly cycles using off-line tapes for master files. Each week, DPDOs submit an 80 column card reflecting each transaction taken that affects a disposable line item to DPDS via AUTODIN (Automatic Digital Network)[6]. Receipts, downgrade-to-scrap actions, transfers, and sales removals are some of the possible transactions. In the course of processing, receipt transactions are "bumped" against a file containing information on items known to contain precious metals (9:1). If a "match" occurs, the DPDO is advised that this item contains a particular precious metal when it receives its Precious Metals Notification List, one of a group of weekly, hardcopy output listings mailed to the DPDO (9:1). This Precious Metals

[6]A communication system used by the DoD to electronically transmit digital computer information from one computer site to another.

Master File contains only information that a particular National Stock Number (NSN) has precious metal in it (9:1). Precious metals weight and precious metals location within the item are not data elements in that file. The usefulness of this file is limited by its relatively small size of 97,000 NSNs (6) out of the 4,845, 169 active NSNs in the DoD supply system (16), and by the fact that the data elements used in file creation were based on parameters other than the identification of precious metals.[7] In addition to inherent file shortcomings, DPDO use of such information is limited since many items are of such poor condition or have such low reutilization or sales potential that they are downgraded to scrap upon receipt and lose their item identity in a scrap accumulation. This means that by the time the DPDO receives notification that an item has precious metals, it can do nothing about it if the item was downgraded upon receipt (9:1). In fiscal year 1979, DPDOs downgraded upon receipt 870,625 or 34.9% of the 2,498,475 line items they received which comprised just over 16% of the total

[7] The Defense Logistics Services Center (DLSC), a DLA Primary Level Field Activity, in Battle Creek, Michigan, provides DPDS with ADP support. With issuance of the 1976 DoDD 4160.22, DPDS recognized the need for a file containing precious metals information. At DPDS' request, DLSC pieced together such a file using the cataloging subsystems of the Defense Integrated Data Systems (DIDS) wherever material content information was available (6). In this context, material content information must be viewed from its importance in meeting item performance specifications and not from a recovery of the material from the item viewpoint.

dollar value received by all DPDOs in fiscal year 1979 (16). With the line item downgrade upon receipt percentage at 34.9%, "real" use of the information contained in the Precious Metals Master File could have only occurred, at best, 65.1% of the time. In short, the current IDMS precious metals notification system is "too little, too late."

Items that are identified by the generating activity, in the receipt inspection process, or by IDMS notification are candidates for precious metals recovery. According to DoD Directive 4160.22, "utilization will take precedence over precious metal recovery [24:p.2]." If an item's anticipated sales proceeds are greater than the net recoverable dollar value of the precious metal in that item, the item will be sold (22:p.XVII-3). If an item is not reutilized or has a sales value less than the net value of the precious metals, it is reported to DPDM-R for disposition instructions (22:p.XVII-4). If DPDM-R advises the candidate item does not contain precious metals or the net recovery value would be negative due to shipment and recovery operations costs, the item is returned to the normal disposal processing flow. If DPDM-R advises the DPDO to ship the item to the appropriate recovery activity,[8] the DPDO arranges for the

[8]Most recovery operations are accomplished at DPDM-R although some recovery efforts are contracted out if DPDM-R does not have the facilities, if the contractor will use the recovered precious metals as Government Furnished Material (GFM), or if a contractor can recover the metals more economically (13:8).

transportation and submits a transfer transaction to the IDMS. Subsequent IDMS interface with the Precious Metals Recovery Management System (PMRMS), a property accounting system for DPDM-R, creates a Weekly Due-In Record (13:7). This suspense file between the IDMS and the PMRMS insures intransit accountability visibility (13:7). Once inspected, verified, segregated, and stored, a DPDM-R receipt is input as a receipt transaction to the PMRMS which clears that item in the suspense file (13:8).

Once on the DPDM-R inventory, items are processed in one of the following ways. If DPDM-R determines the shipped item has sales potential, it will be issued to the nearest DPDO (13:8). Other items are processed for the recovery of the precious metal. Fine precious metal residue is moved to the U.S. Assay Office in New York (22:p.XVII-1). Assayed residue and other precious metal residue is then moved to depositories under control of the Defense Industrial Supply Center (DISC) in Philadelphia, PA (22:p.XVII-7). DISC functions "as the commodity integrated material manager in the supply and Defense Stock Fund management of refined precious metals recovered under the PMRP [22:p.XVII-2]." As the integrated material manager for DoD, DISC provides "precious metals at recovery cost plus authorized surcharge (covering administration, insurance, transportation, etc.) to authorized recipients for internal use or as Government Furnished Material (GFM) [22:p.XVII-2]." Participation

in the PMRP and use of DISC material is mandatory for all DoD components (24:p.2). DPDM-R also maintains accountability of precious metals items shipped direct to recovery contractors. Once the metal is recovered, it is transferred from the DPDM-R account to the contractor, if the contractor is to use the recovered metal (residue) as GFM (13:8). If the contractor is performing recovery operations only, the residue is transferred from the contractor to the DISC depositories after assay.

Chapter 2

PROGRAM PROBLEMS AND PROSPECTS

Past Criticisms and Program Future

The Precious Metals Recovery Program begins with DPDO awareness of precious metals content within a disposable item. This awareness leads it to requesting disposition instructions from DPDM-R. Recovery operations under the direction of DPDM-R lead to use of recovered precious metals as GFM or becoming a DoD item of supply for appropriate operations (24:p.2). Distribution of recovered precious metals falls under the aegis of DISC, as the DoD integrated material manager. DoD components and other Federal Agencies benefit from participation in the PMRP by being able to obtain precious metals at the nominal charge of recovery cost plus administrative surcharge. The use of this source of supply for GFM in contracts or for internal use will undoubtedly result in savings to the participating agencies (22:pp.XVII-6 to XVII-7). To insure the costs of obtaining recovered metals remains attractive to Federal users, DLA was directed to establish standards ensuring the cost effectiveness of recovery efforts and to recommend discontinuance of any part of the program when it had been determined to be no longer cost effective

(24:p.3). Through DoD 4160.21-M, DLA delegated this responsibility to DPDM-R for establishing "standards to measure the efficiency and cost effectiveness of recovery efforts [22:p.XVII-1]."

With the distribution system for reutilizing recovered precious metals established, and the DPDO to DPDM-R transfer and mechanized property accounting system operational, focus can be best directed to the input of additional precious metal bearing items into the recovery cycle. The overriding importance of this assertion has been confirmed by the Defense Audit Service (DAS). In 1978, DAS audited seven DPDOs to determine the effectiveness of the management of the PMRP. The DAS audit revealed that of the disposition of 555 items they knew to contain precious metals, only 16 of these 555, or just 2.9%, had been sent to recovery activities (21:6). DAS further stated that the potential savings of this program could be at least $60 million compared to the then current savings of $15 million (21:3). The report also stated that the key to the future of the PMRP was the identification and subsequent coding of items that contain precious metals (21:4). DAS further found that the system being utilized at that time was outdated, incomplete, inaccurate, and lacked the information to identify and recommend disposition of items containing precious metals (21:1,4). To encourage participation in the PMRP, DAS recommended that a system of reimbursement using claim credits to generating activities be instituted. DAS stated such "incentives

could go far in enabling the program to realize the considerable potential that is indicated [21:8]."

Since the DPDO reports precious metals-bearing items to DPDM-R, the only way input to the recovery cycle can be increased is to increase DPDO awareness of which disposable items contain precious metals. Reliance on often inexperienced and untrained DPDO receiving personnel to increase the identification of precious metals-bearing items leans towards being wishful thinking. Receiving Sections at most DPDOs have a heavy workload and looking for precious metals content is only one of a myriad of receiving tasks a material sorter and segregator must perform. In addition, many items received are complex electrical or mechanical units where precious metals could not be detected unless the item was disassembled. Increased training in precious metals identification may be of some benefit, but the complexity of the items received and a continual heavy workload overwhelms such an increase in worker knowledge. As previously mentioned, DPDO use of the IDMS Precious Metals Notification List misses those items downgraded to scrap upon receipt. The only feasible way to effectively increase DPDO awareness is to have precious metals content information as a requisite entry on the Disposal Turn-In Document (DTID). Most of the information on the DTID is from Military Service/Defense Agency published supply management data (9:1). Though there are more than 97,000 DoD

cataloged items known to contain precious metals (6); in 1978, only 4.6 percent of cataloged items were included in published supply management data (25:35). This was brought to light by LTC Robert L. Woodson in an article appearing in the January-February 1979 issue of the Army Logistician. Woodson went on to emphasize the need for better identification and quantification of items that contain precious metals. To increase precious metals content information in published supply management data, each Military Service/Defense Agency has been assigned the responsibility to identify items they manage containing precious metals by type of metal and the quantity (weight) therein (24:p.4). To insure standardization of the identification technique for all DoD components, DLA was delegated the responsibility for developing a system of standard codes that identify DoD items containing precious metals and the quantity of precious metals residing therein (24:p.3). Once developed by DLA, responsible item managers were to insure that the codes for the identified items were recorded in the Federal Catalog records (24:p.4). Once these precious metals codes are resident in Federal Cataloging records, namely the Defense Integrated Data System (DIDS), the codes will be perpetuated in individual Military Service/Defense Agency supply management data and routinely applied to DTIDs as a mandatory data element (9:1).

A telephone interview with Mr. Vincent Tolino of HQ DLA

(20) and a personal interview with Ms. Pat Sides and Mr. Robert Foster of Air Force Logistics Command (AFLC) Headquarters (19) both revealed that DLA had established a uniform coding system to indicate the amount and type of precious metals present in DoD inventory items. The codes established are called Precious Metals Indicator Codes (PMIC). A draft copy of these PMICs appear in Appendix C. The Defense Logistics Services Center (DLSC) has developed a procedure whereby item managers can input these mandatory DIDS data elements to the DoD cataloging records (12:1). Ms. Sides and Mr. Foster stated that once Air Force PMIC assignment was accomplished in the DIDS, PMICs would be disseminated in Air Force supply management data by the Air Logistics Commands (ALC) using established cataloging channels and procedures (19). Ms. Sides and Mr. Foster indicated that the Air Force had not yet decided on how to screen items in order to apply the DLA-developed PMICs. Each DoD activity has the responsibility to assign codes to all items managed by them; but, to date, no directions have been issued to the responsible activities telling them how to assign these PMICs (19, 20). Both DLA and the Air Force Precious Metals Program Managers have indicated that there was a need to establish a method of coding items for precious metals content that will be cost effective (19,20).

Problem Statement

All the information sources reviewed indicated that there is great potential for monetary savings in the Precious Metals Recovery Program (21:3;25:35). It appears DoD has not managed the program to best advantage to date, and that the key to better administration of the program is in the better identification and coding of items that contain precious metals (21:1; 25:35). With the development of the PMICs, a coding system to indicate the type and quantity of precious metals within each DoD inventory item has been established (12:3). A procedure for item manager input of PMICs to the DIDS has also been established (12:1). The next step is now one of how to screen items in the DoD inventory files for precious metals content in order to assign the proper code. So far, this problem has not been adequately resolved in order to complete the coding process (19,20).

Limited Precious Metals Indicator Code (PMIC) assignment has occurred. DPDS has provided the five DLA item managers[9] listings of those items for which they have cataloging responsibility that appear in the IDMS Precious Metals Master File (6). This master file was extracted from DLSC's Total Item Record (TIR), a

[9]The five DLA item managers are the Defense Electronics Supply Center, Defense Construction Supply Center, Defense General Supply Center, Defense Industrial Supply Center, and the Defense Personnel Support Center.

catalog of all items in the DoD inventory system. The precious metals information in the TIR may be thought of as being "residual" information in that it existed prior to the issuance of the 1976 DoD Directive 4160.22.[10] Since the precious metals information in the TIR and the IDMS Precious Metals Master File is residual, no active PMIC assignment for these listed items had been made by the item manager. Accordingly, DPDS has requested the item managers to review the provided listings, assign the appropriate PMIC, and submit the PMIC to DLSC for input to the TIR (6).

A continuing source of PMIC assignment occurs during routine catalog record maintenance by item managers (9:1). As part of the maintenance action, item managers must provide a PMIC for each item reviewed (9:1). Finally, the Defense Acquisition Regulation (DAR) committee is reviewing a DLA proposal that the new item procurement process include a data item request of the contractor to provide the information needed by an item manager to assign a PMIC (20). If the data item request becomes a reality, the PMIC will become a routine datum element in the cataloging of a new item process.

Creation of a data item for new item PMIC assignment holds promise for resolving the problem of insuring new items entering the

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[10]See footnote 7, Chapter 1.

DoD inventory areaed PMICs. Although the efforts of DPDS providing one-timegs of TIR extractions to item managers, and the assignment of during routine catalog record maintenance procedures will an the PMIC coding task, these actions alone are not enough to completion of the task of assigning PMICs to all existing items DoD inventory system. The DPDS listings account for only items of the active DoD inventory of 4,845,169 (6). Cataloged ire not subject to mandatory periodic review (17). Therefore only undergo record maintenance action when the item manage's to update existing data elements or add new ones. It is posse item may undergo several record maintenance actions a yile another item may never undergo record maintenance in as a DoD cataloged item (17). Accordingly, complete relianatalog record maintenance for PMIC assignment would mor result in incomplete or sub-total PMIC assignment. To date etable for total item PMIC assignment has been established (20 n such a timetable is established, the item managers will difficult task of doing accurate PMIC assignment within theished time constraints.

Research Objectives

One p method of assuring all items under an item manager's cog are assigned an accurate PMIC would be an

item-by-item review. Such a review could be done by item procurement specification and/or technical data package examination supplemented by physical inspection of the item. While such a comprehensive review might be quite accurate, it would no doubt be quite costly to perform and most likely be very time consuming. An alternative to a comprehensive review is the use of some decision rule to limit the number of items to be looked at. For example an item manager may know that the Federal Supply Class (FSC) 5510, Lumber and Related Basic Wood Materials (11), contains no metal at all, and, therefore, would passively assign all items in that FSC PMIC "A" without looking at any individual item in that FSC. In contrast to this PMIC assignment "by default," an item manager may suspect each item in a certain FSC such as FSC 5935, Connectors, Electrical (11), contains some precious metals. They may decide to review every item in that FSC and actively assign a PMIC to each item. Another such decision rule might be to passively assign PMIC "A" to all items with an acquisition cost of less than $1.00, reasoning that such a low dollar value item would contain little or any economically recoverable precious metal. The danger associated with such a low dollar value decision rule is that a sufficient quantity of low dollar value items could be accumulated to make the precious metals recovery economical. The inherent danger in other decision rules is the probability that items assigned PMIC "A" by default actually contain precious

metals.

If an item-by-item review is to be avoided, the item manager must develop decision rules that minimize the probability of assigning a PMIC "A" to items containing precious metals while limiting the number of items to be reviewed to an amount that meets (currently unspecified) specified cost and time constraints. Heuristics or "rules of thumb" may be used as guides in the development of appropriate decision rules for item managers. One such heuristic would be for item managers to use DPDM-R transaction information from the Precious Metals Recovery Management System (PMRMS). Accordingly, the research objective of this thesis is to determine the value of providing DPDM-R transaction information to item managers for their use in identifying precious metals-bearing items. It should be noted that the DPDM-R received items are not limited to the previously provided (to item managers) IDMS Precious Metals Master File items extracted from the DLSC TIR. As previously mentioned, this IDMS file is only one of three sources by which a DPDO may become aware of possible precious metals content in an item. The DPDM-R transaction registers will also contain items whose precious metals content was identified by the other two sources: the generating activity at turn-in and the DPDO receiving personnel during the receipt inspection process. Sub-objectives are to determine:

1) If the items listed on the DPDM-R transaction registers

can be traced back to the responsible item manager.

2) If the precious metals content of traced items have been previously identified by the item manager.

3) Item manager cost of coding DPDM-R identified items.

4) The range of coding usefulness of DPDM-R identified items; i.e., the catalyst effect one identified item has on a similar group of items.

Research Hypothesis

Providing DoD item managers with DPDM-R transaction information to use in assignment of PMICs will result in significant cost savings for DoD.

Chapter 3

RESEARCH METHODOLOGY AND DATA COLLECTION

Research Methodology

One way of determining whether DPDM-R transaction information use by item managers in the assignment of PMICs would result in DoD cost savings is to make a comparison of item manager PMIC assignment costs using DPDM-R transaction information and item manager PMIC assignment costs without using DPDM-R transaction information. This type of cost comparison was made using the Defense Electronics Supply Center (DESC) in Dayton, Ohio as a representative DoD item manager. DESC is a DLA Primary Level Field Activity and is the integrated commodity material manager for electronic and electrical components common to all Military Service/ Defense Agencies (1). The selection of DESC as a representative DoD item manager for purposes of this comparison was based on three factors. First, since precious metals have the attribute of good electrical current conductivity, they are often used in electronic and electrical components like those managed by DESC. Accordingly, it was likely many of the items to be studied would contain precious

metals. Second, since the initial source of data was to be from DPDS and DLSC, both DLA activities, potential interservice/defense agency coordination and cooperation problems were avoided by choosing a DLA item manager over a military service item manager such as the U.S. Army Communications and Electronics Material Readiness Command which would have the same attribute as DESC of a potentially fertile data base. The last reason for choosing DESC was entirely pragmatic. DESC is within ten miles of Wright-Patterson AFB where the authors were assigned. This meant personal interviews with DESC personnel could be accomplished with no travel expense to the Government.

The first step in this cost comparison was to obtain the DPDM-R transaction information. Once the transaction information was obtained, items managed by DESC were identified by using existing DoD cataloging information. Identified DESC managed items were then subjected to a DLSC Total Item Record (TIR) interrogation to determine if the items had already been identified as containing precious metals in that item's Federal Item Identification Guide (FIIG). An FIIG is "a self contained document for the collection, coding, transmittal, and retrieval of item characteristics and related supply management data for an item of supply for logistical use [10:p.i]." For those items not identified as containing precious metals in their respective FIIGs, the cost of determining the

appropriate PMIC from the DPDM-R transaction information was computed. Only costs unique to using the DPDM-R transaction information were used in computing the DPDM-R data use costs.

Similarly, when computing PMIC determination costs without using DPDM-R transaction information, only unique (without DPDM-R data) costs were considered. The costs common to both alternatives for PMIC determination are identified in Chapter 4, Data Analysis, where they are discussed further. DESC was requested to provide a procedure on how they would determine a PMIC for any given item without using DPDM-R transaction information (4). This PMIC determination procedure was segmented into discrete steps with the attendant costs for each step given (3). The cost of determining the appropriate PMIC without using DPDM-R transaction information was computed by aggregating the unique costs of this DESC procedure.

Once both the costs of using or not using DPDM-R transaction information were computed, a simple cost comparison was made. If the cost per item using DPDM-R data to assign PMICs was less than the cost per item to assign PMICs without using DPDM-R data, then providing DPDM-R transaction information to item managers would result in cost savings for DoD. Conversely, if the cost of using DPDM-R data exceeded the cost of not using the DPDM-R data for PMIC assignment, then there is no cost savings basis for providing DPDM-R transaction information to item managers. The significance

of any resultant cost savings accruing from the use of DPDM-R data by item managers is discussed in Chapter 5, Conclusions and Recommendations. The data analysis of Chapter 4 limits itself strictly to the computation of alternative costs and their comparison. Chapter 5 also discusses the range of coding usefulness of DPDM-R transaction information.

Data Collection

The data collection began with the receipt of the DPDM-R transaction information to be used in this study. The DPDM-R transaction information came from a cumulative register of all transactions processed in the Precious Metals Recovery Management System (PMRMS) for a particular month. The PMRMS is the property accounting system for DPDM-R and was briefly discussed in Chapter 1. The PMRMS became operational in May 1979 with the first cumulative monthly transaction register printed at the end of June 1979 (18). The PMRMS monthly transaction registers for the months of June, July, August, September, and December 1979 were used as the data base for DPDM-R transaction information. These data were received from DPDS on microfiche. DPDS advised extra copies of the October and November 1979 microfiche were no longer available (18). Since sufficient data were available from the microfiche that were provided, the absence of these two months' data appeared to be

insignificant.

The specific transactions to be further looked at from these transaction registers were those transactions showing the disposition of a National Stock Numbered (NSN) item. Only items identified by an NSN were used in the study since an NSN was the only assurance that an item in the PMRMS, in the DLSC TIR, and in DESC files were the same item. Transactions involving Local Stock Numbers (LSN), Scrap Classification Lists (SCL), and Scrap Designator Class Codes (SDCC) in lieu of NSNs were disregarded. This meant only downgrade-upon-receipt transactions, Document Identifier Codes (DIC) XP1 and XP2, were relevant since only they showed the disposition of an NSN item into a specific SCL or SDCC (13:27-45). The primary distinction between a DIC XP1 transaction and a DIC XP2 transaction is that an XP1 transaction allows an item to be downgraded to either an SCL or an SDCC while an item downgraded via an XP2 transaction must show disposition into an SDCC (13:32). Downgrading an item to an SCL using an XP2 transaction will cause that transaction to reject from the PMRMS (13:32). Another distinction between the two transactions is that an XP1 accounts for SCL or SDCC weight in other than troy ounces while an XP2 accounts for SDCC weight in troy ounces (13:12).

From the PMRMS monthly transaction register data base, only two transaction types, XP1 and XP2, show NSN disposition into an SCL or SDCC. These two transactions are the basis for what has

been called DPDM-R transaction information. These transactions become information because the SCL or SDCC tells the type of precious metal the NSN contains. The SDCC is more definitive than the SCL since categorization of the downgraded NSNs into a specific SDCC provides information as to what percent of the SDCC weight is precious metals (13:75). Scrap Classification Lists (SCL) do not provide estimated percentages of precious metals content. The primary purpose of SCL codes is "to classify scrap for maximum sales potential [14:66]." Thus, the distinction between SDCCs and SCLs is one of purpose. SDCCs were developed with the estimation of the percent of precious metals in a particular Scrap Designator Class Code in mind while SCLs were developed to ensure the segregation of scrap into accumulations that would maximize sales proceeds. Examples of SDCCs and SCLs appear in Appendix D and Figure 1, respectively. Though both SDCCs and SCLs (except XP2) are allowable in the current PMRMS, SCLs are really more relevant in a property disposal context, given their true purpose. In our data analysis, only SDCCs were found and subsequently used. Since SDCCs provided estimated precious metals weight percentages where SCLs did not, it was considered fortunate that all the NSNs studied were downgraded to SDCCs.

Transaction information of NSNs downgraded into SDCCs was next screened to isolate only those transactions whose NSNs

SCL codes are used to classify scrap into its proper scrap commodity group to obtain maximum sales potential and to provide a uniform method for maintaining accounting records. These codes do not apply to property in other than scrap condition; i.e., that which has value other than for its basic materiel content.

SCL Code	Description
AØ1	Tabulating cards. Manila-colored (includes manila-colored cards with tinted edges) cards should be segregated and sold separately from other colored cards.
AØ4	Books and magazines.
AØ5	Mixed paper. Free of any nonpaper substances that cannot be manufactured into paper or products by the process normally used for making paper. Obsolete forms with carbon inserts should be segregated and sold separately.
AØ6	Old corrugated and cardboard.
CØ3	Rags, miscellaneous, not covered in other SCL codes.
D12	Silver-zinc, mercury and nickel-cadium batteries.
D1A	Sheet aluminum. Plant scrap, generated by shearing, clipping, cutting, blanking, or similar process, also defective, rejected, or otherwise discarded wrought aluminum parts and castings. Must be free of foreign materiel.
D1B	Aluminum foil, aluminum screen.
D1C	Obsolete aluminum solids. Pure old cable, sheet, and sheet utensils, old castings and forgings free of nonaluminum attachments.
D1D	Irony aluminum. Should be segregated from normal generations of wrecked aircraft aluminum because of the higher percentage of aluminum recovery. Consists of solids generated from obsolete or rejected parts, components, or accessories from which all nonaluminum parts have not been removed, and borings and turnings containing excessive oil and other contamination. Large quantities of borings and turnings should be segregated.
D1E	Wrecked aircraft. Aluminum consisting of at least 50 percent aluminum by weight, recovered from wreckage of aircraft, salvaging of grounded and obsolete aircraft; demilitarization of combat or tactical aircraft, or salvaging of rejected airframes and components. Do not include magnesium scrap which is prohibitive to aluminum smelting and processing.

Figure 1. Scrap Classification Lists

were managed by DESC. A DLA publication, Directory of Interservice Supply Support-Coordinators and Contact Points, was used to identify those Federal Supply Classes (FSC) in which DESC managed items. These FSCs are listed in Table 1 (8:26). Transaction information NSNs in these FSCs were then screened again using the end of December 1979 Catalog Management Data (CMD) file to ascertain that DESC did indeed manage that NSN. The CMD file is published monthly by DLSC and contains standarized catalog management data pertaining to a NSN such as unit of issue, unit price, and source of supply information (7:1). The source of supply is indicated by an item manager's Routing Identifier Code (RIC) (7:1). DESC's RIC is S9E (8:26).

Once DESC managed NSNs were identified, an interrogation of the DLSC Total Item Record (TIR) was made to see if an individual NSN had precious metals information already resident in its Federal Item Identification Guide (FIIG). A FIIG is comprised of approved item names, item characteristics data requirements, equivalency and substitution criteria, and supplementary technical and supply management data (10:p.i). Precious metals information appears in the supplementary technical and supply management data section (10:p.vi). The TIR interrogation resulted in a hardcopy listing entitled "NIIN/PSCN Interrogation Search Replies." For each NSN interrogation, all data (called a reply) pertaining to a Primary Address Code was listed. A Primary Address Code (PAC) is a

TABLE 1

FEDERAL SUPPLY CLASSES (FSC)
OF DESC INTEREST

FSC	ITEM CATEGORY
5805	Telephone and Telegraph Equipment
5815	Teletype and Facsimile Equipment
5820	Radio and Television Communication Equipment, Except Airborne
5821	Radio and Television Communication Equipment, Airborne
5825	Radio Navigation Equipment, Except Airborne
5830	Intercommunication and Public Address Systems, Except Airborne
5831	Intercommunication and Public Address Systems, Airborne
5835	Sound Recording and Reproducing Equipment
5895	Miscellaneous Communication Equipment
5905	Resistors
5910	Capacitors
5915	Filters and Networks
5920	Fuses and Lightning Arresters
5925	Circuit Breakers
5930	Switches
5935	Connectors, Electrical
5945	Relays and Solenoids
5950	Coils and Transformers
5955	Piezoelectric Crystals
5961	Semiconductor Devices and Associated Hardware
5962	Microcircuits, Electronic
5965	Headsets, Handsets, Microphones and Speakers
5985	Antennas, Waveguide, and Related Equipment
5990	Synchros and Resolvers
5999	Miscellaneous Electrical and Electronic Components
6625	Electrical and Electronic Properties Measuring and Testing Instruments

> Four-position code which is assigned to an FIIG requirement for identification of the requirement, cross-referencing requirements in the various sections and appendices of the FIIG, and for mechanized processing and retrieval of FIIG generated data [10:p.ii].

There are three designated PACs item managers reply to with exclusive regard to precious metals information. PAC PRMT, Precious Material, tells the type of precious metals resident in the NSN (10:p.3-1). PAC PMWT, Precious Material and Weight, gives the weight of any precious metals in that NSN (10:p.3-1). PAC PMLC, Precious Material and Location, tells where the precious metals are located in or on the NSN (10:p.3-2). There may be more than one precious metal resident to an NSN. In that case, there may be multiple replies to these designated precious material PACs. If an NSN had the PACs of PRMT and PMWT answered, then no additional precious metals information would be required to assign a Precious Metals Indicator Code (PMIC) since the revelant criteria for PMIC assignment are precious metals content and its weight (see Appendix C). NSNs without replies to either PAC PRMT or PAC PMWT but with some precious metals information in their FIIG are further discussed in Chapter 4. The data used to determine what PMIC applied to those NSNs not identified in their respective FIIGs as containing precious metals was the DPDM-R transaction information. Chapter 4 shows that the SDCC and the weight of the line item recorded in that transaction are the key data elements.

The cost of using the DPDM-R transaction information was developed in two ways. First, the manhours required to determine the applicable PMIC were taken from the authors' experience in actually assigning PMICs for these NSNs using the DPDM-R data. Next, the cost attributable to these manhours were based on the authors' perception as to the grade level of the work involved. These perceptions were based partially on the DESC PMIC assignment procedure discussed below and partially on the authors' own work experience. The data used to determine DESC's cost of determining the appropriate PMIC for an NSN not identified as having precious metals in its FIIG were the procedure they provided. This procedure listed the various steps DESC would take in determining the PMIC for these NSNs (3). At each step, the type of work involved and the type and grade of worker required to do that step were listed. In addition, the standard manhours to do the type of work required and the manhour cost was provided. Therefore, the data used to determine the cost of item manager PMIC assignment without use of DPDM-R transaction information were the DESC provided procedure. To determine the cost of item manager PMIC assignment using DPDM-R transaction information, the data used were the DPDM-R transaction information and the authors' experience in assigning PMICs from that data.

Assumptions and Limitations

The foremost assumption being made in conducting this test is that DESC is similar enough to the other DoD item managers that experiences gained from this test can be transferred to other item managers with a minimum of costly special data adaptations. This assumption is supported by the fact that all Military Service/Defense Agency supply management item identification data are stored in the Defense Integrated Data System's (DIDS) TIR. The TIR is under the physical control of DLSC. DLSC is the TIR file custodian since individual item managers are responsible for the input and maintenance of data records for the items they manage. DLSC, at the Office of the Secretary of Defense (OSD) direction, through HQ DLA, specifies what data elements are mandatory, the record maintenance procedures, and record format. By editing item managers' inputs and allowing access to only those segments of the TIR for which an input's Document Identifer Code is authorized, DLSC controls what categories of data are stored in the TIR and insures only authorized DoD standardized data elements reside in the TIR. This means that all DoD item managers are going to be entering PMICs as a mandatory TIR datum element using the same DIDS input transaction, in the same format, and subject to the same edits as DESC. As a corollary, all DoD item managers have access to the same item identification data in the TIR

as that used at DESC. Each DoD item manager has an FIIG for each generic group of items that it manages in the same standardized format as DESC's FIIGs.

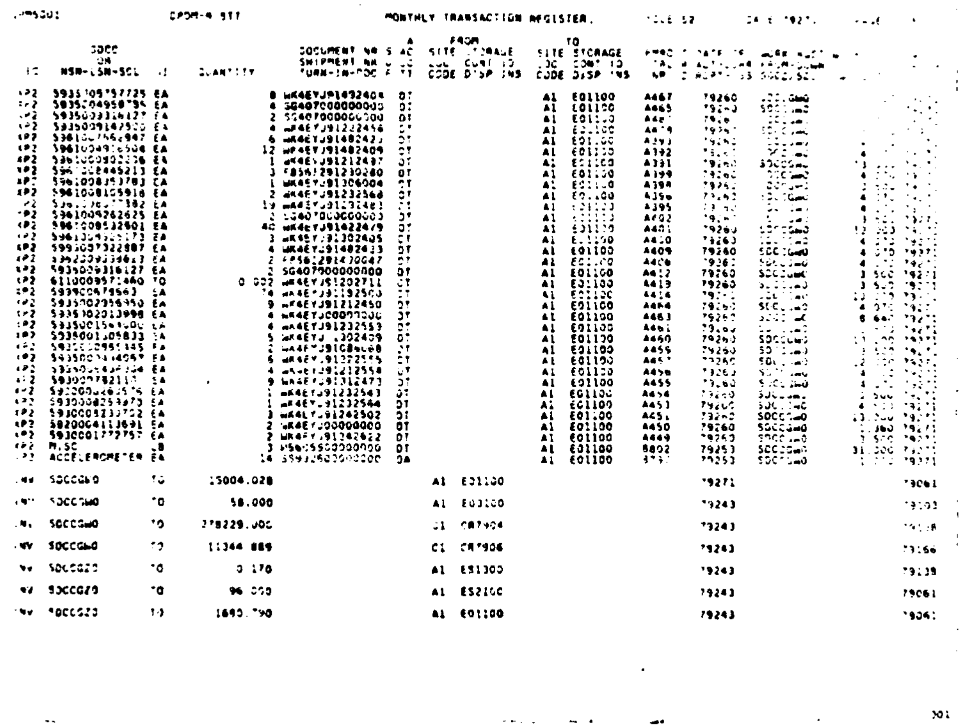
Two assumptions in using the DPDM-R data are made. First, it is assumed that DPDM-R receiving personnel assigned the correct Scrap Designator Class Code when downgrading the NSNs used in this study. The strength of this assumption could be determined by an inspection of the DPDM-R receipt process using precious metals knowledgeable personnel. Also, the strength of this assumption is a function of the receiving personnel's precious metals training and job experience. The second assumption is that DPDM-R receiving personnel are correctly determining an item's weight upon downgrading. If receiving personnel are merely transferring the weight recorded on the shipping document to the receipt document, this assumption may not be too strong. On the other hand, if DPDM-R receiving personnel are physically weighing each downgraded item, then this assumption is considerably strengthened. A limitation on the DESC procedure is that DESC will likely search no further than its own records in order to assign PMICs (4). This procedural limitation is based on DESC's estimation that requesting precious metals information from sources outside of DESC would be very costly, time consuming, and most likely result in little or no more useful information (4).

Chapter 4

DATA ANALYSIS

Preliminary Analysis

The monthly transaction registers of the Precious Metals Recovery Management System (PMRMS) for the months of June, July, August, September, and December 1979 were reviewed in order to establish a DPDM-R transaction information base. Only those transactions showing the downgrade of an NSN into a Scrap Classification List (SCL) or Scrap Designator Class Code (SDCC) were considered. Transactions of this type were identified by Document Identifier Codes (DIC) of XP1, Receipt/Downgrade Card (Other Than Troy Ounce), and XP2, Receipt/Downgrade Card (Troy Ounce) (13:12). Typical transactions of this type can be seen in Figure 2, a sample DPDM-R monthly transaction register. All microfiche frames from the five months' transaction registers showing XP1 and XP2 transactions with NSNs were reproduced. Next, using the information of Table 1 from the January 1979 Directory of Interservice Supply Support-Coordinators and Contact Points, all XP1 and XP2 transactions with a Federal Supply Class (FSC) in which DESC manages items were highlighted. Highlighted NSNs were researched in the



MONTHLY TRANSACTION REGISTER.

[illegible]	5DCCGWO	TO	15004.028	A1	E01100	79271	79061
[illegible]	5DCCGWO	TO	58.000	A1	E01100	79243	[illegible]
[illegible]	5DCCGWO	TO	278229.000	C1	CR7904	79243	[illegible]
[illegible]	5DCCGWO	TO	11344 889	C1	CR7906	79243	79156
[illegible]	5DCCGZ0	TO	0 170	A1	E51300	79243	79139
[illegible]	5DCCGZ0	TO	96 000	A1	E5210C	79243	79061
[illegible]	5DCCGZ0	TO	1693.790	A1	E01100	79243	79061

Figure 2. DPDM-R Monthly Transaction Register

Catalog Management Data (CMD) file to ascertain that DESC did indeed manage that NSN (7:1). One-hundred, twenty-six different NSNs showed a source of supply in the CMD file as S9E, the Routing Identifier Code (RIC) of DESC (8:26). These 126 NSNs became the DPDM-R transaction information base.

The NSNs comprising this transaction information base were each placed on an index card with the SDCC they were downgraded to, along with their corresponding document number. None of the 126 recorded transactions were downgraded to an SCL. The 126 NSNs were taken to DESC to see if precious metals information was already recorded in each NSN's respective Federal Item Identification Guide (FIIG). Using a remote terminal, DESC requested a DLSC Total Item Record (TIR) interrogation for each of the 126 NSNs (2). This interrogation was done on the last nine digits or National Item Identification Number (NIIN) of each NSN; the first four digits of the NSN being the FSC. The result of this interrogation was a hardcopy listing, entitled "NIIN/PSCN Interrogation Search Replies." This listing printed all item identification information for each NIIN available in Segments A, B, C, E, H, and M of the TIR. Of the 126 NIINs interrogated, 36 came back with FSCs different from what the DPDM-R NSNs had or for which the desired information was no longer available due to age and/or non-use of the NIIN. These 36 NSNs were considered to be "nonresponsive" and were deleted from the remainder of the study. The remaining 90

NIINs on the interrogation listing had FSCs that matched those of the DPDM-R NSN and had adequate information available to determine whether precious metals information was recorded on that NSN's FIIG.

Of the 90 responsive NSNs, 65 had some precious metals information in their respective FIIGs. Forty-eight of these 65 had replies to all the designated precious metals Primary Address Codes (PAC) of PRMT, Precious Material; PMWT, Precious Material and Weight; and PMLC, Precious Material and Location. Four NSNs had replies to the PACs of PRMT and PMWT but not PMLC. Since a PMIC can be determined on the basis of precious metals type and weight, the absence of a reply to PMLC is not significant for PMIC assignment purposes. With precious metals identification and its weight the relevant criteria, 52 NSNs or close to 58% of the 90 responsive NSNs studied already had enough precious metals information in their FIIGs to assign a PMIC. Obtaining additional information about these 52 NSNs to assign PMICs was not necessary. The thirteen other NSNs having some precious metals information in their FIIGs but not enough to assign a PMIC to them were further researched. This research was undertaken in the context of the thesis subobjective of determining the range of coding usefulness DPDM-R identified items have. The scope and results of this research are discussed in Chapter 5.

The remaining 25 NSNs of the responsive 90 found are those

for which no precious metals information was available in their FIIGs. It was on these 25 NSNs that a cost comparison of assigning PMICs by using DPDM-R transaction information versus assigning PMICs without DPDM-R transaction information was made. Before analyzing the unique costs of each PMIC assignment method, a discussion of costs common to both methods is required. Regardless of whether DPDM-R transaction information is used or not, the first step in the PMIC assignment process is to interrogate the TIR and see if enough precious metals information is in an NSN's FIIG to make a PMIC determination from existing file data (2;3;4). In this study, "enough precious metals information" has been defined as having the two precious metals PACs of PRMT and PMWT answered for that NSN. The cost of interrogating the TIR, regardless of where the NSN in question came from, is constant (2;4). An NSN interrogation resulting from DPDM-R transaction information costs the same as an NSN interrogation resulting from an independent item manager inquiry. When a TIR interrogation reveals that there is not enough FIIG information to make a PMIC assignment, other PMIC determination methods must be pursued. It is here that the DPDM-R transaction information method and the non-DPDM-R data method differ in costs. Each method has its own unique costs. The eventual cost comparison will be on the individual unique costs documented in this area. After a PMIC determination has been made, both methods again incur a common cost. The

PMIC determined must be input to the TIR. The cataloging cost of this TIR input should be the same whether this input is the result of one method or the other (2;4). The cost of inputting any one character code is constant. The TIR input cost is not affected by the determination method of the PMIC. The PMIC assignment process, then, is an area of variable costs, depending on method of PMIC determination, bounded on one side by the constant cost of TIR interrogation and on the other side by the constant cost of PMIC input to the TIR. The unique costs incumbent to each PMIC determination method are now addressed.

Using DPDM-R Transaction Information

If there is inadequate or no precious metals information in an NSN's FIIG from which to make a PMIC determination, review of PMRMS transactions showing the downgrade of an NSN to a Scrap Designator Class Code (SDCC) may lead to the appropriate PMIC determination. As discussed in Chapter 3, SDCCs provide an estimate of what percentage of an item's weight can be attributed to a precious metal. Although an XP1 transaction allows for an item's downgrade to a Scrap Classification List (SCL), all the XP1 transactions in this study showed an NSN disposition to an SDCC. Appendix D provides three groupings of SDCCs, one group of SDCCs each for gold, silver, and the platinum family of metals (13:75-79). Using XP1/XP2 transaction information from PMRMS monthly transaction

registers such as Figure 2, the authors were able to determine the type of precious metals in an NSN and its estimated weight. The type of precious metals in the NSN can be determined by looking at the SDCC it was downgraded to (see Appendix D). The precious metal's estimated weight is the product of an NSN's unit of issue weight and the estimated percentage precious metal's weight is of total item weight. The NSN's line item weight appears in Figure 2 as the number immediately preceding the "Date Enter File" column. To determine an NSN's unit of issue weight, the line item weight is divided by the line item quantity of that NSN. Line item quantity is the number immediately preceding the "Document Nr" column in Figure 2. The estimated precious metal percentage for an SDCC appears in the last column in an SDCC's grouping (see Appendix D). With an item's precious metals content and the estimated weight of this content known, one can proceed to the definition of PMICs listed in Appendix C. After converting the estimated weight to grams (31.103 grams to a troy ounce), determining a PMIC is a simple matter of picking the alpha or numeric character corresponding to the appropriate "Type Precious Metal" and "Content Value" criteria.

Applying the above procedure, the authors assigned PMICs to the 25 NSNs for which no precious metals information was available in their FIIGs. Table 2 illustrates the PMIC assignment process using DPDM-R transaction information. For example, NSN

TABLE 2

PMIC ASSIGNMENT PROCEDURE

NSN	SDCC	Troy Oz LINE ITEM WGT	QTY	Troy Oz NSN WGT	PM %	PRECIOUS METAL WEIGHT	WGT IN GRAMS	PMIC
5961-00-807-7882	GWO	4.07	19	.2142	.02	.0000428	.0013	G
5961-00-491-6504	GWO	4.07	12	.3392	.02	.0000678	.0021	G
5961-00-011-6774	GWO	10.0	6	1.667	.02	.0003333	.0104	G
5935-00-643-6904	GWO	4.07	4	1.018	.02	.0002035	.0063	G
5935-00-154-4000	GWO	3.5	4	.875	.02	.000175	.0054	G
5935-00-826-0576	GWO	3.5	1	3.5	.02	.0007	.0218	G
5930-00-825-9970	GWO	4.5	1	4.5	.02	.0009	.0280	G
5905-00-982-7028	GWO	12.0	2	6.0	.02	.0012	.0373	G
5820-00-857-9385	GWO	4.07	3	1.357	.02	.0002713	.0084	G
5915-00-849-3468	GWO	8.0	6	1.333	.02	.0002667	.0083	G
5961-00-766-2947	GWO	4.07	6	.6783	.02	.0001357	.0042	G
5961-00-810-5918	GWO	4.07	2	2.035	.02	.000407	.0127	G
5961-00-835-3783	GWO	3.5	1	3.5	.02	.0007	.0218	G
5961-00-844-5213	GWO	4.07	3	1.357	.02	.0002713	.0084	G
5961-00-852-5173	GWO	4.07	3	1.357	.02	.0002713	.0084	G
5961-00-853-2601	GWO	12.0	40	.3	.02	.00006	.0019	G
5905-00-081-8361	SLO	1.0	5	.2	3.0	.006	.1866	E
5905-00-134-9874	SLO	1.0	1	1.0	3.0	.03	.9331	E
5915-00-985-0867	SLO	1.0	4	.25	3.0	.0075	.2333	E
5935-00-008-1161	SLO	3.0	4	.75	3.0	.0225	.6998	E
5960-00-849-5736	SLO	1.0	1	1.0	3.0	.03	.9331	E
5945-00-374-8882	SLO	1.0	1	1.0	3.0	.03	.9331	E
5935-00-060-9523	SLO	1.0	5	.2	3.0	.006	.1866	E
5961-00-789-4031	GRO	.63	13	.0485	.15	.0000728	.0023	G
5962-00-087-1078	GRO	78.0	38	2.786	.15	.0041786	.1300	G

5961-00-807-7882 is shown in Figure 2 being downgraded from an NSN to SDCC GWO by use of an XP2 transaction. By referring to Appendix D, one can see SDCC GWO is electronic gold scrap. Approximately .02% (.0002) of an NSN's weight in SDCC GWO is attributable to the presence of gold (13:78). From Figure 2, one can see this line item weighed 4.070 troy ounces and consisted of 19 individual items. Weight is in troy ounces because XP2 transactions only account for weight in that measure (13:12). The NSN unit of issue weight is the line item weight (4.070 troy ounces) divided by the line item quantity (19); .2142 troy ounces (4.070 ÷ 19). One unit of NSN 5961-00-807-7882 weighs .2142 troy ounces. Of this unit weight, it is estimated .02% is attributable to precious metals. The weight of the gold in this NSN is .00004284 troy ounces (.2142 X .0002). Using the PMIC assignment criteria of Appendix C, after converting .00004284 troy ounces to .0013 grams, PMIC "G" would be assigned since NSN 5961-00-807-7882 was downgraded to a gold bearing SDCC and contained less than 10 grams of gold. The remaining 24 NSNs appearing in Table 2 were assigned a PMIC in the same manner as described above.

The initial cost of using DPDM-R transaction information for item manager PMIC assignment is that cost associated with providing the item manager the appropriate transaction information for the managed NSNs. The authors' spent eight manhours identifying

the DESC managed NSNs downgraded to an SDCC that were subsequently subjected to TIR interrogation. Three manhours were spent reproducing those microfiche frames from the five months' DPDM-R transaction registers that contained XP1 and XP2 transactions with NSNs whose FSCs appear in Table 1. Four manhours were spent looking up the source of supply for each identified NSN on the Catalog Management Data (CMD) file to insure DESC was the item manager. This step was necessary because DESC does not manage all the items in all the FSCs that are listed in Table 1 (2). An additional manhour was spent transferring DESC managed NSNs to index cards for keypunch operations preceding TIR interrogation. After TIR interrogation and identification of the 25 NSNs which did not have sufficient precious metals information in their FIIGs for PMIC assignment, the authors spent another two manhours assigning PMICs to these 25 NSNs. The entire PMIC assignment process for items managed by DESC appearing in five months' worth of DPDM-R transaction information took about ten manhours of manual labor.

Based on the authors' experience and the type and grade level of personnel at DESC performing similar functions, it is anticipated an experienced GS-5 clerk could perform the entire PMIC assignment process using DPDM-R transaction information. A GS-5 at step 6 makes about $6.25 an hour. For the ten hours expended, it would have cost $62.50 to assign PMICs to the 25 NSNs appearing in Table 2.

This computes to a PMIC assignment cost of $2.50 per NSN. This is the basic cost of using DPDM-R transaction information to assign PMICs. Costs incidental to this process such as microfiche frame reproduction and associated administrative costs to formally inform DESC of such NSNs would add to this basic direct labor cost of $2.50 per item. For example, the authors made twelve microfiche reproductions. If each reproduction cost ten cents a piece, total reproduction cost for the 25 NSNs would come to $1.20, adding about five cents to the per item cost. If the transmittal of these NSNs from DPDS or DLSC to DESC cost about five dollars to cover routine typing and mailing costs, the per item cost would rise by about 20 cents per item. Adding in the incidental costs of five cents for microfiche reproduction and 20 cents for administrative and transmittal costs, the total cost per item assigned a PMIC using DPDM-R transaction information comes to $2.75 per item.

PMIC Assignment Without DPDM-R Transaction Information

In analyzing this PMIC assignment method, the source of direction as to what NSNs were to be assigned PMICs was not considered. The analysis of this method began after the directed NSNs had been interrogated in the TIR, and those NSNs which did not have sufficient precious metals information in their FIIGs for PMIC

assignment were identified. The following is the procedure DESC would use to assign PMICs to these NSNs (3). After these NSNs are identified in the Cataloging Division at DESC, a GS-3 clerk would build a data package for each NSN. In building this data package, the clerk would request a drawing of the NSN from the DESC data depository. At the data depository, a GS-4 clerk would pull the drawing, have it reproduced, refile the drawing, and send the reproduction back to the GS-3 clerk building the data package. After receiving the drawing reproduction, the GS-3 clerk would forward the data package to a GS-9 equipment specialist in the Technical Services Division. After making the PMIC determination, the equipment specialist would annotate the data package with the appropriate PMIC and return the data package back to the GS-3 cataloging clerk. The GS-3 clerk would then prepare the appropriate TIR input.

In estimating the cost to assign a PMIC to one NSN using the above procedure, DESC advised the manhours used were based on manpower standards developed for that type of activity or on manpower standards for similar activities (3). DESC estimated the duties of the GS-3 cataloging clerk would consume .3 hours per NSN. A GS-3 step 6 clerk makes just over five dollars an hour. If it takes 18 minutes of the clerk's time at five dollars per hour to build a data package for one NSN, then the per item cost is $1.50. The cost to reproduce the drawing is 75 cents. The manpower standard says it takes 20 minutes for a GS-4 to pull, reproduce, and refile the

drawing. A GS-4 step 6 makes close to $5.65 an hour. Therefore, reproducing the drawing for an item costs about $1.88. Based on similar actions, it would take a GS-9 equipment specialist about two-thirds of an hour to review the NSN's drawing, make a PMIC determination, and annotate the data package. A GS-9 step 6 makes about $9.55 an hour. If it takes the equipment specialist two-thirds of an hour to make and finalize a PMIC determination, then the per item cost is about $6.37. With the equipment specialist's cost per item at $6.37, labor cost to reproduce the drawing at $1.88, the reproduction itself costing $.75, and the cost of building a data package for an item at $1.50, the total PMIC assignment cost per item without using DPDM-R transaction information comes to $10.50.

Cost Comparison

In this study, 25 NSNs were assigned a PMIC using DPDM-R transaction information at a cost of $2.75 per NSN. It was shown that without using DPDM-R transaction information to assign PMICs, an item manager such as DESC would expend $10.50 per NSN. This $7.75 cost difference is the minimum cost savings that could occur using DPDM-R transaction information. The DPDM-R data cost figure must be considered as a maximum cost since 80% of the man-hours used in the DPDM-R data method went toward manual processes that could be easily mechanized by DPDS and DLSC. It wouldn't be

much effort for DPDS to sort all its PMRMS transactions and produce a magnetic tape of just XP1 and XP2 transactions of NSNs downgraded to an SDCC. DLSC could "bump" this tape against a file containing item manager information for NSNs and produce various output listings (or keypunch cards or magnetic tapes) sorted by item manager. These output products could then be sent to item managers for PMIC assignment based on the DPDM-R transaction information procedure developed in this chapter. The point made here is that the $2.75 DPDM-R data method cost is most likely a maximum cost.

On the other hand, the PMIC assignment cost of $10.50 per NSN documented when not using DPDM-R data is most likely a conservative estimate. If the item manager's data depository does not contain the drawing required for a PMIC determination, additional costs may be incurred. In DESC's case, although the 75 cent reproduction charge is avoided and some of the GS-4's time is saved, these savings will more than likely be negatively offset by the additional costs of requesting drawings from other item managers (3). The cost of obtaining a drawing rises even more if no military service/defense agency has a copy of it, and the item manager must order a drawing from the manufacturer, for a fee (3). It is doubtful DESC would consider ordering a drawing from outside sources because such a request would most likely not be cost effective (3;4). If this were the case, it is highly likely that any NSNs for which no drawings were

available at the DESC data depository would be coded PMIC "A" or PMIC "3," by default (4). Assigning PMICs in such situations could lead to substantial cost dissavings accruing to the DoD if the PMIC "A" or PMIC "3" NSNs did indeed have significant quantities of precious metals in them; quantities that could be determined by using DPDM-R transaction information.

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions About the Research Hypothesis

The research hypothesis of this thesis was that providing DoD item managers with DPDM-R transaction information for use in PMIC assignment would result in significant cost savings for DoD. It was shown in Chapter 4 that item manager use of DPDM-R transaction information to assign PMICs could result in a minimum cost savings of \$7.75 per NSN coded. While the per item cost savings appear to be significant, the total cost savings that could have been realized if this study had been implemented would have only amounted to \$193.75. This total cost savings figure was the result of five months of DPDM-R transaction information yielding only 25 DESC managed NSNs that did not already have precious metals information in files that were readily available to item managers. Assuming the 25 NSN yield from 5 months of DPDM-R transaction information would be a typical or an average yield, the annual yield of NSNs that could be coded in this manner by DESC would come to 60 (five per month times 12 months). The projected annual savings to DoD for assigning PMICs to DESC managed items would be 60 NSNs yielded per year

times the $7.75 per NSN savings or $465.00. While this is a cost savings, it does not appear to be significant. Assuming the annual NSN yield of the other four DLA item managers matched DESC's annual yield of 60, total DLA item manager savings would only come to $2325 (5 item managers times $465). This total DLA-wide cost savings does not appear to be significant either.

While the results of this study do not offer any substantial support to the hypothesis of significant cost savings, they definitely do not lean in the direction of disproving the research hypothesis. What the results do indicate is that significant cost savings on a per NSN basis can be achieved. What this study did not address is a forecast of the probable yield of NSNs not having existent precious metals information in readily accessible item manager files. If the five NSNs per month of DPDM-R transaction information yield found in this DESC study is to be indicative of a DoD-wide yield, then using DPDM-R transaction information for PMIC assignment will probably not result in significant cost savings to DoD.

If the hypothesis of use of DPDM-R transaction information for PMIC assignment is to be further researched, it is recommended that a threshold yield number of NSNs be determined. This threshold would be a level where using the DPDM-R transaction information would result in significant cost savings to DoD. "Significant cost savings" would have to be quantitatively defined by the DoD Precious Metals Recovery Program manager. Once a dollar figure was determined, the threshold yield of NSNs could be calculated by dividing the per

NSN cost savings of $7.75 into the dollar figure of cost savings significance. For example, if DLA determined that a cost savings had to be at least $100,000 per year to be significant, then the threshold NSN yield would have to be over 12,900 NSNs a year. For every month of DPDM-R transaction information used, 1075 NSNs without precious metals information in existing item manager files would have to be found.

Without an authoritative definition of what amount of cost savings constitutes a "significant cost savings" and without knowing the expected yield of NSNs with no precious metal information in existing files, the results of this study can not be construed as either proving or disproving the research hypothesis. It is felt that this study has shown that cost savings can be gained by item manager use of DPDM-R transaction information. Further research is required to determine the significance of these cost savings.

Accomplishment of Research Objectives

The research objective of this thesis was to determine the value of providing DPDM-R transaction information to item managers for their use in identifying precious metals bearing items. That value was determined to be a $7.75 cost savings in determining precious metals content when an NSN had no precious metals information in item manager files. However, such a cost savings would accrue for only about 28% of the NSNs (managed by an item manager like DESC) identified by the DPDM-R transaction information. For DESC,

only 25 out of 90 responsive NSNs had no precious metal information in their FIIGs. In the conduct of this study, all four sub-objectives of this thesis were accomplished. It was found that it was quite easy to trace back NSNs appearing on DPDM-R transaction registers to their responsible item managers. However, it was noted that items accounted for by other than NSNs such as Local Stock Numbers (LSN), SCLs, or SDCCs could not be traced back to item managers as a practical matter. Item manager identification of NSNs is readily accomplished through the cross-referencing properties of the Catalog Management Data (CMD) file published monthly by DLSC. By reviewing an NSN's FIIG information, available as the result of a TIR interrogation, it could be determined if an NSN had been previously identified as having precious metals content. The item manager cost of coding DPDM-R identified items was provided by DESC and most likely could be provided by other item managers as well. The fourth sub-objective is discussed at length in the following section.

The Range of Coding Usefulness of PMRMS Information

The final sub-objective of this thesis was to determine if DPDM-R identified items could be used as a catalyst to find other items containing precious metals. In addition to being able to assign

a PMIC to an NSN using DPDM-R transaction information, could additional research of DPDM-R identified items lead to identification of other items containing precious metals? The opportunity for this additional research occurred during review of the FIIG output received as the result of the TIR interrogation of the original 126 DESC managed items appearing on the five months' transaction registers. Of the 90 responsive NSNs, 13 had some precious metal information in their FIIGs but not enough on which to base a PMIC assignment. Specifically, these 13 NSNs lacked information on precious metals content (PAC PRMT) or precious metals weight (PAC PMWT) or both. Nine NSNs had replies to the PACs of PRMT and PMLC (precious metals location) but lacked the weight information which a reply to PAC PMWT would have provided. Two other NSNs had replies to PRMT only. The last two NSNs had no replies to any of the precious metals PACs of PRMT, PMWT, or PMLC. What these last two NSNs did have were replies to other PACs that indicated the presence of precious metals. For example, the replies to the PACs of AHSB, Tubing Inside Surface Treatment, and AHTJ, Flange Inside Surface Treatment, for NSN 5985-00-104-9974, Waveguide Assembly, were both "Silver Plated." The PACs of ABEM, Body Surface Treatment, and AFRH, Contact Surface Treatment, for NSN 5999-00-172-4918, Electrical Contact, were answered with replies of "Gold Plate over Nickel."

This knowledge that precious metals information could be contained in PACs other than the designated precious metals PACs of PRMT, PMWT, and PMLC was the basis for an inquiry into the usefulness of researching other NSNs in the same FIIG as the DPDM-R identified NSNs. The first step in this procedure was to review the TIR interrogation and identify those NSNs for which not enough or no precious metals content and weight information were available in an NSN's FIIG. All PAC replies for those NSNs were then reviewed. If any precious metal information appeared as a reply, the PAC replied to was recorded along with the FIIG it was a part of. After this two-step process was completed, a list of the precious metal information-bearing PACs and their FIIGs were forwarded to DLSC (2). DLSC ran a PAC "detail" in each PAC identified for which any NSN in that FIIG had a precious metal reply recorded against it (5). For example, using NSN 5999-00-172-4918 above, PAC details were run in FIIG A222A, Contact/Clip, Electrical, for the two PACs of ABEM and AFRH which in the TIR interrogation showed surface treatments of gold plate over nickel. For these surface treatments, PAC details were run for all NSNs in those two PACs in that FIIG which had replies indicating precious metals content surface treatment. Besides a reply of "Gold Plate over Nickel," other precious metals content replies for the PACs of ABEM and AFRH in FIIG A222A for other NSNs that could be made include

surface treatment replies such as iridium, palladium, platinum, platinum alloy, rhodium, silver, and silver alloy.

To further illustrate this process, it became known from the TIR interrogation that NSN 5985-00-104-9974 above, which is in FIIG A073, had silver plated inside surface treatment in tubing (PAC AHSB) and in a flange (PAC AHTJ). Using these two PACs, all NSNs with precious metals content replies to these PACs were "detailed" by reply code within a PAC for FIIG A073. Table 3 is a sample of some of the permissible reply codes to PACs in FIIG A073 concerning surface treatments. It is interesting to note that there is considerable information as to how a precious metal was applied to the surface and about the metal's grade in addition to specifying the precious metal itself. In the case of NSN 5985-00-104-9974, both relevant PACs were replied to with code AGEØØØ, Silver Plated (not otherwise specified). Table 4 is a sample of a PAC detail for PAC AHSB for NSNs with a reply code of AGEØØØ. By looking at the PAC "Summary" for how many times PAC AHSB was answered by reply code AGEØØØ, it was found that NSN 5985-00-104-9974 was only one of 1129 NSNs in FIIG A073 that had the PAC of Tubing Inside Surface Treatment answered as silver plated.

A PAC Summary report was provided by DLSC for each PAC detail run (5). It is simply a count of how many NSNs in that FIIG have a particular reply code answering a particular PAC

TABLE 3

SAMPLE PAC REPLIES FOR FIIG A073

REPLY	REPLY CODE
OXIDE (not otherwise specified)	XX0000
OXIDE FILM, MIL-C-5541	XX0002
OXIDE FILM, MIL-C-5541, TYPE 1	XX0004
OXIDE FILM, MIL-C-5541, TYPE 1, GRADE A, CLASS 3	XX0008
@OXIDE FILM, MIL-C-5541, TYPE 1, GRADE C, CLASS 3	XX0014
OXIDIZED (not otherwise specified)	XD0000
PAINT (not otherwise specified)	PNG000
PAINT, BLACK (not otherwise specified)	PND000
PAINT, BLACK, FED STD 595, NO. 37038 OR NO. 27038	PN0007
PAINT, EPOXY (not otherwise specified)	PNAJ00
PAINT, MIL-STD-171, NO. 20.8	PN0034
PAINT, MIL-STD-171, 20.8, BLACK	PN0081
PAINT, MIL-STD-171, 20.8, OLIVE DRAB	PN0077
PAINT, MIL-STD-171, 21.3	PN0078
PAINT, MIL-STD-171, NO. 21.9	PN0035
PAINT, MIL-STD-171, 21.9, COLOR 26132, FED STD 595	PN0080
PAINT, MIL-STD-171, 21.11	PN0079
PAINT, OLIVE DRAB (not otherwise specified)	PNH000
PAINT, PRIMER, TT-P-636	PN0013
PAINTED (not otherwise specified)	PN0000
PAINTED, W/PRIMER UNDERCOAT (not otherwise specified)	PNJ000
PALLADIUM FLASHED (not otherwise specified)	PDB000
PALLADIUM PLATED (not otherwise specified)	PDA000
PASSIVATED (not otherwise specified)	PS0000
PASSIVATED, QQ-P-35	PS0007
PASSIVATED, QQ-P-35, TYPE 2	PS0005
PHOSPHATE (not otherwise specified)	PH0000
RED OXIDE (not otherwise specified)	XXC000
RHODIUM FLASHED (not otherwise specified)	RHC000
RHODIUM PLATED (not otherwise specified)	RHA000
@RHODIUM PLATING, MIL-R-46085; TYPE 1, CLASS 1	RH0003
SILVER (not otherwise specified)	AG0000
SILVER, MIL-F-14072	AG0004
SILVER, QQ-S-365	AG0002
SILVER, QQ-S-365, TYPE 1	AG0014
SILVER, QQ-S-365, TYPE 1, GRADE A	AG0005
SILVER, QQ-S-365, TYPE 1, GRADE B	AG0006
@SILVER, QQ-S-365, TYPE 1, CLASS 3	AG0088
SILVER, QQ-S-365, TYPE 2	AG0003
SILVER, QQ-S-365, TYPE 2, GRADE A	AG0007
SILVER, QQ-S-365, TYPE 2, GRADE B	AG0008
SILVER, QQ-S-365, TYPE 3, GRADE B	AG0010
SILVER NICKEL (not otherwise specified)	AGA000
SILVER PLATED (not otherwise specified)	AGE000
SILVER PLATED, MIL-STD-171, FINISH NO. 1.7.1	AG0035
SILVER PLATED, MIL-STD-171, FINISH NO. 1.7.3	AG0038
SILVER PLATED, QQ-S-365	AG0012
SILVER PLATED WITH RHODIUM FLASH (not otherwise specified)	AGF000
SODIUM DICHROMATE (not otherwise specified)	NA0000
STAINED (not otherwise specified)	FNH000
TIN PLATED (not otherwise specified)	SNF000
TIN PLATED, MIL-STD-171, FINISH 1.8.1	SN0027
ZINC CHROMATE (not otherwise specified)	ZNA000
@ZINC CHROMATE, MIL-P-6889	ZN0084
ZINC CHROMATE, MIL-P-6889, TYPE 1	ZN0046
ZINC CHROMATE, MIL-P-8585	ZN0115
ZINC COATED (not otherwise specified)	ZNS000
ZINC W/CHROMATE, MIL-P-8585	ZN0062

TABLE 4

SAMPLE PAC DETAIL

PAC Detail by Reply Code and Mode Code Within PAC Within FIIG

FIIG INC	NSN	PAC	MC	TY	CR	REPLY COMPLETE	REPLY
A07300		AHSB	D			AGE000	
00305	5840000970052			M	N	AGE000	
00305	5826000993881			K	N	AGE000	
00305	5985001048502			4	N	AGE000	
00305	5985001049974			1	N	AGE000	
00305	6625001067504			M	N	AGE000	
00305	5965001123332			1	N	AGE000	
00305	5985001135024			1	N	AGE000	
00305	5985001135025			1	N	AGE000	
00305	5965001135026			4	N	AGE000	
00305	5985001135027			1	N	AGE000	
00305	5965001136787			1	N	AGE000	
00305	5985001136788			1	N	AGE000	
00305	5965001136789			1	N	AGE000	
00305	5985001136847			1	N	AGE000	
00305	5985001158017			1	N	AGE000	
00305	5985001173922			K	N	AGE000	
00305	5985001174702			K	N	AGE000	
00305	5985001201273			K	N	AGE000	
00305	5985001274294			4	N	AGE000	
00305	5840001278534			M	N	AGE000	
00305	5985001283614			K	N	AGE000	
00305	5985001283827			K	N	AGE000	
00305	5840001349947			M	N	AGE000	
00305	5840001349949			M	N	AGE000	
00305	5985001350149			4	N	AGE000	
00305	5985001358627			4	N	AGE000	
00305	5985001377934			M	N	AGE000	
00305	5985001377935			1	N	AGE000	
00305	5985001377936			1	N	AGE000	
00305	5985001377937			1	N	AGE000	
00305	5985001377938			1	N	AGE000	
00305	5985001378118			K	N	AGE000	
00305	5985001387071			1	N	AGE000	
00305	5841001395972			4	N	AGE000	
00305	5841001395973			4	N	AGE000	
00305	5985001410070			M	N	AGE000	
00305	5985001415957			K	N	AGE000	
00305	5985001415969			K	N	AGE000	
00305	5985001415971			K	N	AGE000	
00305	5985001438134			K	N	AGE000	
00305	5985001454567			M	N	AGE000	

(23:p.5.9-1). Review of the PAC summaries for FIIG A073 indicated that there were 3101 occurrences of an NSN having a precious metals content reply to the appropriate PACs. As of 24 March 1980, there were 10,486 NSNs in FIIG A073 (15). Though tempting, it is not correct to say 30% of all the NSNs in FIIG A073 have precious metals content reply codes since many NSNs may have more than one PAC which are replied to with precious metals content replies. It is correct, however, to state that 1129 NSNs or close to 11% of the total FIIG A073 NSNs have silver plated, inside surface treated tubing. Currently, there are no designated precious metals PACs of PRMT, PMWT, and PMCL in use for FIIG A073 (2). If FIIG data is to be used in the PMIC assignment process, the potential usefulness of knowledge such as the 1129 NSNs known to have silver plated inside tubing will be lost unless PACs other than the designated precious metals PACs are looked at.

The point made is that designated precious metals PACs may be a useful starting place for obtaining the information needed to assign PMICs. However, to limit an FIIG-PMIC coding process just to designated precious metals PACs would be a waste of a readily available source of needed information that lends itself to mechanical manipulation. Non-precious metals designated PACs also appear to be important sources of precious metals information in an FIIG that has precious metals designated PACs such as FIIG A222A. According

to the PAC summary report for the PAC of PRMT in FIIG A222A, there are 5991 different NSNs with different precious metals replies. Yet, for the reply of gold for surface treatment PACs in FIIG A222A, there are 7024 occurrences of different NSNs identified as having their surfaces treated with gold. There are 4987 NSNs surface treated with silver and 187 NSNs surface treated with rhodium. No direct comparison of the NSNs having replied PRMT PACs to replied surface treatment PACs (replied with precious metals content) can be made because the PRMT counts include all types of precious metals replies. There is also the chance of double counting the surface treated NSNs because many contacts may have both silver and gold plating. However, just comparing the gold surface treated 7024 NSNs to the 5991 PRMT NSNs indicates at least 1033 NSNs are in FIIG A222A with documented gold content that are not identified by the designated precious metals PACs. The implication is clear. If FIIG data is to be used in assigning PMICs, replies to PACs other than the designated precious metals PACs' replies must be looked at. To do otherwise would be to ignore a readily available, easily mechanically manipulable, and fertile source of existing precious metals information.

Corollary Observations

It was observed during the course of this study that there is

a noticeable lack of standardization in one of the most important data elements used in the Defense Precious Metals Program. This data element is the unit of measurement for weight. Each observed DLA Primary Level Field Activity (PLFA) involved in the precious metals program used a different unit of measurement to record precious metals weight. Precious metals weight was recorded by the grain in the item managers' FIIGs. DPDS activities preferred accounting for precious metals weight by the troy ounce. Finally, the PMICs themselves call for making weight distinctions, in order to assign the codes, based on grams. It is felt this lack of weight measurement unit standardization is deleterious to the precious metals program. Problems can arise from conversion of one weight unit into another. The most obvious problem is if these weights are to be converted manually. With a clerk working with equations such as one grain equaling .064799 grams, 28.35 grams equaling one avoirdupois ounce, and 31.103 grams equaling one troy ounce, conversion errors are bound to happen. Once the error has occurred, it not only stands a very good chance of remaining undetected but of also being perpetuated as it is transmitted from one data system to another. If weight unit conversion was to be accomplished mechanically, the proponents of mechanical conversion are faced with the problem of data systems interface difficulties. Such interface difficulties open up the possibilities of negative impacts on other parts of the data

systems that were not intended to be involved. Another important factor in considering data systems interface is the cost associated with successful completion of such interfaces. To avoid such conversion problems and their associated costs, it is suggested that all the DLA PLFAs involved in the precious metals program adopt a standardized unit of precious metals weight measurement.

It was noted that in order to assign a PMIC, a weight distinction based on grams had to be made. The use of grams as the unit of weight measurement to distinguish levels of precious metals content appears to be questionable. The PMICs for gold bearing items are "F" for items with 10 or more grams of gold and "G" for items with less than 10 grams of gold. In the study of 25 NSNs managed by DESC for which the authors assigned PMICs, 18 had been downgraded to the gold bearing SDCC of GWO. Of these 18 NSNs, only one had even as much as one-tenth of one gram of gold content. Only five had as much as one-fiftieth of one gram of gold. For the 7 NSNs downgraded into the silver bearing SDCC of SLO, three had about one gram of silver content. However, the PMIC distinction of "D" and "E" is based on a threshold weight of 15 grams. In the case of PMIC assignment of these 25 NSNs, especially the gold bearing NSNs, using grams as a measure of weight to distinguish the content value of the precious metals is like using miles as the unit of measurement to distinguish between different persons' heights.

If the threshold level is one mile, all persons would be assigned the code for heights less than a mile. It is felt this may be the case in making precious metals content value distinctions with threshold levels such as 5, 10, or 15 grams. Codes reflecting content above those threshold levels might never be assigned if the 25 NSNs studied are indicative of the precious metals content of NSN items.

It is recommended that a study be made across the spectrum of precious metals bearing items to develop ranges of precious metal weights by metal type. Such statistically sufficient ranges would give an indication of the weight distributions of precious metal types across the supply system. Based on these weight distributions, the appropriate unit of weight measurement could be determined. The appropriate unit might very well be grains; not grams. It is noted that most of the existing, readily available, and mechanically accessible precious metals information in the DoD files, namely the FIIGs, is recorded in grains.

A final point on the current use of threshold weights to assign PMICs is the logic behind having a two-tier coding system. A two-tier coding system only seems to be logical if two conditions are met. First, as previously discussed, the threshold level must be meaningful. Second, any threshold level, regardless of the unit of measurement used, should reflect the economic question of whether to undertake the expense of recovering the precious metal for a net

profit or effecting normal DPDO disposition of an item if it is not cost effective to recover the precious metal from that item. The question of cost effectiveness will not be pursued any further here, but any two-tier system of precious metals indicator coding should be based on that quantity of precious metals that constitutes the recovery break even point.

Recommendations

The foregoing discussions about conclusions drawn from testing the research hypothesis, the range of coding usefulness of PMRMS information, and related observations made during the course of the study all have suggested certain actions that might be of benefit to the Defense Precious Metals Program. These suggestions are capsuled below:

1. This study has shown a $7.75 savings per NSN coded can be achieved by item manager use of DPDM-R transaction information to assign PMICs. The significance of this cost savings is dependent on the number of NSNs yielded for PMIC assignment using the DPDM-R data in the manner described in Chapter 4. It is recommended that DLA set a dollar value for what constitutes significant cost savings. This dollar value divided by $7.75 will dictate the minimum yield of NSNs required by the DPDM-R transaction information process. Further research is required to

estimate NSN yield for the item managers that are to be considered. If this further research was restricted to DLA item managers, a DLA-wide NSN yield could be estimated. This estimate would then be compared to the NSN yield threshold dictated by the specification of what constitutes significant cost savings for DLA. If the NSN yield equaled or exceeded the threshold level of NSNs, then DLA item manager use of DPDM-R transaction information is advised.

2. If PMIC assignment is to be made on the basis of FIIG information, it is recommended that other relevant PACs like material content and surface treatment in addition to the designated precious metals PACs of PRMT, PMWT, and PMLC be investigated. The brief analysis of these other relevant PACs in this chapter has indicated that a readily available, easily mechanically manipulable, and fertile source of precious metals information already exists.

3. The measurement unit for weight should be standardized throughout the Defense Precious Metals Program. The standardized unit chosen should have the attribute of allowing meaningful distinctions to be made between weights of different items. Grains as the standardized measurement unit has two advantages. First, grains will allow for meaningful distinctions if such distinctions are considered necessary. Second, FIIG files carry precious metals' weights in grains.

4. A study should be undertaken to determine the ranges of

precious metal weights by metal type. The resulting weight distributions may indicate that making weight distinctions for PMIC assignment is unnecessary. The current two-tier structure of the proposed PMICs may be unneeded. If so, the number of codes needed to identify precious metals type could be cut in half, simplifying the entire coding process. As a final note, a two-tier coding structure only appears necessary if the ultimate goal of the PMICs is to indicate whether it is cost effective to recover the precious metals from an item known to contain precious metals.

One PMIC Assignment Strategy

The long term solution to the problem of assigning PMICs to all supply systems items appears to be the creation of a data item. If a precious metals information data item request is made part of the procurement process, it is envisioned that PMICs would be assigned in the initial cataloging of a new item (20). Eventually, the new items would supersede the old items in the supply system, and all supply systems items would have a PMIC assigned. However, such an occurrence might be twenty or more years in the future. Therefore, creation of a precious metals data item for new item procurement holds little promise for solving the current dilemma of PMIC assignment to existing items. Indeed, the only near term benefit of the creation of such a data item would be if one of these

new items was to be disposed of; it would have an appropriate PMIC on the Disposal Turn-In Document (DTID). Currently, the only continuous action to assign PMICs to existing items occurs when these items undergo routine catalog record maintenance (9:1). As discussed in Chapter 2, the periodicity and frequency of individual item record maintenance is not known (17). Some discontinuous PMIC assignment efforts have occurred as the result of DPDS initiated actions to provide item managers with precious metals information for NSNs identified in the IDMS Precious Metals Master File (6). It appears that more continuous actions to identify items for PMIC assignment are required if a one-time, item-by-item review of all DoD cataloged items is to be avoided.

If an item-by-item review is not an acceptable PMIC assignment alternative for the reasons cited in Chapter 2, and the validity of adopting certain heuristics such as not looking at any NSNs with dollar values under $1.00 can not be ascertained, the only remaining PMIC assignment alternative is the adoption of an incremental strategy. An incremental strategy means using existing sources of precious metal information and assigning PMICs to NSNs whenever the opportunities arise. The routine catalog record maintenance method of assigning PMICs is a part of the incremental strategy. Another part of this strategy would be investigation by item managers into their FIIG files. All NSNs with the PACs of PRMT and PMWT should

be assigned PMICs immediately. The information required for PMIC assignment is readily available and is amendable to mechanical manipulation. Indeed, the DoD definition of a PAC states that one purpose of a PAC is "for mechanized processing and retrieval of FIIG generated data [10:p.ii]." A preceding section in this chapter has shown that FIIG use should not limit itself just to the PAC combinations of PRMT and PMWT. Other PACs, particularly those concerned with material requirements and surface treatments are a fruitful source of precious metals information.

In addition to making use of all available FIIG information for PMIC assignment, item managers might profit from using DPDM-R transaction information to assign PMICs. The data analysis of Chapter 4 showed PMIC assignment can be made directly from the DPDM-R transaction information by looking at XP1 and XP2 transactions. It was shown that it is considerably cheaper on a per item basis to assign PMICs from DPDM-R transaction information then not to use such information when it is available. It is also important to note that, on occasion, DPDM-R transaction information is the only source of precious metals information available.

An incremental strategy also means DPDO receiving personnel should bring uncertainties about whether a particular item has precious metals content or not to the attention of knowledgeable personnel. This might mean shipping questionable items to DPDM-R

and letting them answer the question of precious metals content. If it was forecast that shipping questionable items to DPDM-R might result in unwarranted expenses, it is possible some sort of precious metals "challenge" program might be established to determine precious metals content by DPDM-R use or item manager use of existing precious metals information-bearing files. Finally, in order for an incremental strategy of PMIC assignment to work, all DoD components associated with the PMIC assignment process must recognize the availability of existing sources of precious metals information, learn the information file structure to make the most of the information available, and most importantly, take the initiative to exploit existing information resources to get the Precious Metals Indicator Coding done.

APPENDIX A

SUMMARY LIST OF ACRONYMS

ADP	- Automatic Data Processing
AUTODIN	- Automatic Digital Network
CMD	- Catalog Management Data
DAS	- Defense Audit Service
DESC	- Defense Electronics Supply Center
DIC	- Document Identifier Code
DIDS	- Defense Integrated Data System
DISC	- Defense Industrial Supply Center
DLA	- Defense Logistics Agency
DLSC	- Defense Logistics Services Center
DoD	- Department of Defense
DPDM-R	- Defense Property Disposal Precious Metals Recovery Office
DPDO	- Defense Property Disposal Office
DPDS	- Defense Property Disposal Service
DTID	- Disposal Turn-In Document
FIIG	- Federal Item Identification Guide
FSC	- Federal Supply Class
GFM	- Government Furnished Material
IDMS	- Integrated Disposal Management System
LSN	- Local Stock Number
NIIN	- National Item Identification Number
NSN	- National Stock Number

PAC	- Primary Address Code
PLFA	- Primary Level Field Activity
PMIC	- Precious Metals Indicator Code
PMRMS	- Precious Metals Recovery Management System
PMRP	- Precious Metals Recovery Program
RIC	- Routing Identifier Code
SCL	- Scrap Classification List
SDCC	- Scrap Designator Class Code
TIR	- Total Item Record

APPENDIX B

GLOSSARY OF TERMS

Demilitarization Code. An alpha code assigned by the responsible Inventory Control Point to a supply systems item indicating if an item is on the U.S. Munitions List and, if a Munitions List Item, the extent of multilation required to destroy its inherent military offensive or defensive advantage.

Disposable Property. Personal property classified as scrap, rip-out material, excess, surplus, exchange/sale, and foreign excess.

Excess Personal Property. That quantity of an item of Military Service/Defense Agency owned property that is not required for its needs and the discharge of its responsibilities as determined by the head thereof.

Federal Item Identification Guide (FIIG). A self-contained document for the collection, coding, transmittal, and retrieval of item characteristics and related supply management data for an item of supply for logistical use. Each generic group or type of items generally has its own FIIG. The scope of an individual FIIG is indicated by its index of approved item names.

Fine Precious Metals. Precious metals of a stated purity level. For gold, this purity level is 23 karat.

Foreign Excess. That quantity of an item of Military Service/Defense Agency owned property located outside the United States, Puerto Rico, the Virgin Islands, American Samoa, Guam, and the Trust Territories of the Pacific Islands that is not required for its needs. Foreign excess is not eligible for donation and goes directly to sale as foreign excess after required DoD reutilization and other Federal Agency screening is accomplished.

Generating Activity. That component or unit of a Military Service/ Defense Agency whose DoD Activity Address Code appears on the Disposal Turn-In Document (DTID).

Lot. A grouping of individual items for the purpose of increasing the total proceeds from sale of the items. Lotting considerations include type of property, its condition, and acquisition cost.

Personal Property. Property of any kind or any interest therein, except for real property and records of the Federal Government. Real property constitutes land, buildings, structures, utilities systems, improvements and appurtenances thereto including equipment attached to and made part of buildings and structures.

Primary Address Code (PAC). A four-position code used in an FIIG to identify a particular information requirement. Common information requirements are the material content and surface treatments of

items covered by an FIIG.

Scrap. Property appearing to have no value except for its basic material content.

Scrap Classification Lists (SCL). A three-position code used to indicate the basic material content of property no longer accounted for as an item. SCL codes are used to classify scrap into its proper scrap commodity group to obtain maximum sales potential.

Scrap Designator Class Code (SDCC). A three-position code used to indicate the precious metals content of an item and the estimated percentage the precious metals are of the item's weight.

Surplus. If excess personal property is not reutilized by the DoD or transferred to another Federal Agency, it is classified as surplus and is then available for donation screening and subsequent sale, if not donated. Foreign excess is never classified as surplus, but is available for sale after reutilization/transfer screening.

APPENDIX C

PRECIOUS METALS INDICATOR CODES (PMIC)

PMIC	TYPE PRECIOUS METAL		CONTENT VALUE
A	No known Precious Metal		None
B	Item is known to contain precious metal(s) but the amount(s) are unknown		
C	Presence or absence of Precious Metals varies between items of production for the same item of supply		
D	Silver		Equals 15 grams or more
E	Silver		Less than 15 grams
F	Gold		Equals 10 grams or more
G	Gold		Less than 10 grams
H	Platinum		Equals 10 grams or more
I	Platinum		Less than 10 grams
J	Palladium		Equals 5 grams or more
K	Palladium		Less than 5 grams
L	Iridium	See Note 1	Equals 20 grams or more
M	Iridium		Less than 20 grams
N	Rhodium		Equals 15 grams or more
O	Rhodium		Less than 15 grams
P	Osmium		Equals 10 grams or more

PMIC	TYPE PRECIOUS METAL		CONTENT VALUE
Q	Osmium		Less than 10 grams
R	Ruthenium	See Note 1	Equals 10 grams or more
S	Ruthenium		Less than 10 grams
T	Silver-Gold		Combination equals 15 grams or more
U	Silver-Gold		Combination contains less than 15 grams
V	Silver-Platinum Family		Combination equals 15 grams or more
W	Silver-Platinum Family		Combination contains less than 15 grams
X	Silver-Gold-Platinum Family	See Note 1	Combination equals 15 grams or more
Y	Silver-Gold-Platinum Family		Combination contains less than 15 grams
Z	Gold-Platinum Family		Combination equals 10 grams or more
2	Gold Platinum Family		Combination contains less than 10 grams
3	Determination of Precious Metal Content in uneconomical		

NOTES:

1. Platinum Family includes Platinum, Palladium, Iridium, Rhodium, Osmium, Ruthenium.

APPENDIX D

SCRAP DESIGNATOR CLASS CODES (SDCC)

SILVER-BEARING SCRAP DESIGNATOR CLASS CODES

Percentage (*) represents the estimated precious metals percentage within the specified SDCC. Parentheses figures (**) may be used as multipliers when converting Avoirdupois pounds of specified SDCCs to estimate the amount of precious metal content expressed in troy ounces.

SDCC	UNIT OF ISSUE	DESCRIPTION	PERCENT	
SAØ	TO	Silver Flakes	90% (13.13)	* **
SA1	TO	Consists of used anodes, drillings from anodes and grain silver, wire for welding or brazing, and all other silver of a purity content of 90 percent or better.	90% (13.13)	
SBØ	Lb	Consists of silver foil battery plates separated by magnesium plates and silver chloride sheets	55% (8.03)	
SB1	Lb	Consists of large silver zinc batteries which require manual breakdown and separation of battery plates (primarily research and DSRV submarine batteries).	18% (2.63)	
SB2	Lb	Consists of silver bearing residue derived from incineration of class "N" batteries and class "E" battery cells.	33% (4.81)	
SMØ	Lb	Silver Bearing Ash	25% (3.60)	
SM1	Lb	Silver Sludge	25% (3.60)	
SDØ	Lb	Film, exposed or unexposed	1% (0.15)	
SD1	Lb	Reserved		
SEØ	Lb	Battery cell sections consisting of a plastic container (approximately 1/8" thick), some cells containing a silver chloride solution.	15% (2.22)	
SKØ	TO	Silver-bearing amalgam	33% (4.81)	

SILVER-BEARING SCRAP DESIGNATOR CLASS CODES (Continued)

SLØ	Lb	Silver-bearing plated electrical components such as leads, capacitors, and other silver plated or bonded materials.	3%
SL1	Lb	Reserved	
SL2	Lb	Reserved	
SNØ	Lb	Silver-bearing batteries encapsulated in epoxy-type plastic with metal cases and attachments.	10% (1.46)
SN1	Lb	Navy batteries (Mark 67-61)	
SN2	Lb	Reserved	
SP1	Ea	Silver recovery cartridge consisting of a spun metallic filter through which spent hypo solution has been filtered.	(.38)
SRØ	Lb	Desalter Kits	30% (4.38)
SZØ	Lb	Miscellaneous	

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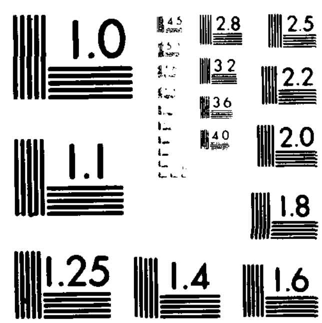

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GOLD BEARING SCRAP DESIGNATOR CLASS CODES

(ALL GOLD BEARING SCRAP DESIGNATOR CLASS CODES
REPORT IN TROY OUNCE UNIT OF ISSUE)

Class	Estimated Gold Percentage
GAØ Gold powder, foil and pellet	99% (14.43)
GBØ Processed scrap (semi-refined) from precious metal recovery	96% (14.00)
GCØ Gold leaf	95% (13.85)
GDØ Dental casting alloys Type 1 and 2	87% (12.68)
GFØ Dental casting alloys type 3 and 4 and brazing alloy type 1, class 3 and 4 and type 2, class 2	77% (11.23)
GHØ Brazing alloy type 1, class 1 and 1 linqual bars, alloy goldwire	55% (8.014)
GMØ Brazing alloy type 2, class 1	37.25% (5.43)
GNØ Buttons	0.9% (0.13)
GPØ Used anodes and turnings	0.27% (0.04)
GQØ Gold slug	0.19% (0.03)
GRØ Gold plated and washed material such as badges, insignia, lapel pins, electronic pins, connectors, contacts, etc.	0.15% (0.02)

Examples:

Campaign Ribbon Lapel Buttons	Length of Service Awards
Letters "U.S."	Safety Awards
Eagles, large and small	Purple Heart Medals
2nd Lt. Bars	Amphenol Plugs
Safe Driving Awards	Spring Contacts

GOLD BEARING SCRAP DESIGNATOR CLASS CODES (Continued)

GSØ Gold clad teflon, fiber, cloth, etc.	.03% (0.43)
GTØ Gold solutions, chemical combinations, etc.	.03% (0.43)
GUØ Gold filled eye glass frames	3.42% (0.50)
GVØ Electronic modules, gold plated inside and out, i.e., translators, junction boxes, amplifiers, frequency multiplier, mixers, etc.	1.36% (0.20)
GWØ Electronic scrap such as, Circuit Boards, amplifiers, oscillators, power supplies, volt meters, gauges, convertors, waveguides, etc. Material in this class range from .021 to 2265.0 Au troy ounces/ton and may require segregation and/or breakdown for processing.	.02% (0.003)
GW1 Reserved	
GW2 Reserved	
GW3 Reserved	
GXØ Gold bearing scrap requiring segregation. Primarily such material as found in classes N, R, U and W.	.09% (0.013)
GZØ Miscellaneous	

PLATINUM-BEARING SCRAP DESIGNATOR CLASS CODES

SDCC	UNIT OF ISSUE	DESCRIPTION	
P9A	TO	Platinum-Plated Scrap	(.001)
P91	EA	Platinum Bearing Spark Plugs	(.009)
P92	EA	Platinum Bearing Breakers	(.009)
PHØ	TO	Rhodium Bearing Scrap	(.013)
PAL	TO	Palladium Bearing Scrap	(.001)
PUT	TO	Ruthenium Bearing Scrap	(.001)
PRI	TO	Iridium Bearing Scrap	(.001)
POS	TO	Osmium Bearing Scrap	(.001)

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